

WHAT IS CLAIMED IS:

1 1. A system for deployment in space comprising:

2 a free-flying platform equipped and adapted to carry
3 out one or more utility functions in space; and

4 a servicing and inspection apparatus including a
5 container that defines therein a chamber dimensioned and
6 configured to receive said platform and that has an opening
7 through which said platform may pass into and out of said
8 chamber, a door movably connected to said container so as
9 to be movable between a closed position in which said door
10 closes said opening and an open position in which said door
11 opens said opening, and a closing mechanism connected to
12 said door and adapted to selectively move said door to said
13 closed position so as to retain and secure said platform in
14 said chamber in said container.

1 2. The system according to claim 1, wherein said free-flying
2 platform has a substantially spherical outer configuration.

1 3. The system according to claim 2, wherein said free-flying
2 platform has no outward protrusions or projections
3 extending outwardly beyond said substantially spherical
4 outer configuration.

1 4. The system according to claim 2, wherein said free-flying
2 platform has a soft resilient outer skin forming said
3 substantially spherical outer configuration.

1 **5.** The system according to claim 1, wherein said free-flying
2 platform is equipped with a battery, a fuel tank,
3 maneuvering thrusters, on-board electronics, a
4 communication transmitter and receiver, and at least one
5 item selected from the group consisting of mission-specific
6 instrumentation, a camera, a sensor, and a tool.

1 **6.** The system according to claim 1, further comprising a space
2 vehicle or a space station, wherein said servicing and
3 inspection apparatus is mounted on an outside of said space
4 vehicle or said space station.

1 **7.** The system according to claim 6, further comprising a
2 monitoring and control station that is arranged inside said
3 space vehicle or said space station and that includes
4 monitoring, control and communication electronics enabling
5 an astronaut in said space vehicle or said space station to
6 monitor, control and communicate with said free-flying
7 platform outside of said space vehicle or said space
8 station.

1 **8.** The system according to claim 1, wherein said closing
2 mechanism includes a motor arranged to drive said closing
3 mechanism so as to selectively move said door between said
4 open position and said closed position.

1 **9.** The system according to claim 8, wherein said apparatus
2 further comprises at least one light beam device that is
3 arranged in said container and that is connected for signal
4 transmission so as to trigger an operation of said closing
5 mechanism when said free-flying platform passes into a path
6 of a light beam emitted by said light beam device.

1 **10.** The system according to claim 9, wherein said apparatus
2 further comprises at least one of a positioning mark and a
3 reflector arranged on an inner side of said door or on an
4 inner upper rim of said container around said opening, and
5 cooperating with said light beam emitted by said light beam
6 device.

1 **11.** The system according to claim 1, wherein said apparatus
2 further comprises a light emitting diode arranged on an
3 inner side of said door or on an inner upper rim of said
4 container and adapted to be used to detect a position of
5 said free-flying platform.

1 **12.** The system according to claim 1, wherein said container
2 includes sloping inner walls that taper inwardly away from
3 said opening and bound said chamber to have a tapering
4 funnel-shape.

1 **13.** The system according to claim 1, wherein said apparatus
2 further comprises a camera arranged in said container.

1 14. The system according to claim 1, wherein said apparatus
2 further comprises a photoelectric switch that is adapted to
3 detect a position of said free-flying platform and is
4 arranged in said container.

1 15. The system according to claim 1, wherein said apparatus
2 further comprises a cushion that is arranged on an inner
3 side of said door and that is configured, dimensioned and
4 positioned to press against and fixedly hold said
5 free-flying platform in a docked position in said chamber
6 when said door is in said closed position, and said
7 apparatus further comprises a docking cradle that is
8 arranged in said container on a side of said chamber
9 opposite said opening and that is configured, dimensioned
10 and positioned to receive and fixedly hold said free-flying
11 platform in said docked position.

1 16. The system according to claim 1, wherein said free-flying
2 platform is equipped with a battery, and wherein said
3 apparatus further comprises an electrical power source and
4 at least one of an electrical contact and an inductive
5 coupling connected to said power source and arranged and
6 adapted to supply electrical power to said free-flying
7 platform in said chamber so as to re-charge said battery of
8 said free-flying platform.

1 17. The system according to claim 1, wherein said free-flying
2 platform is equipped with on-board electronics and

3 electrical connector contacts connected to said
4 electronics, and wherein said apparatus further comprises
5 electrical connector contacts adapted and arranged to mate
6 with said electrical connector contacts of said free-flying
7 platform when said free-flying platform is in a docked
8 position in said chamber.

1 **18.** The system according to claim 1, wherein said free-flying
2 platform is equipped with a fuel tank and a fuel filling
3 connection connected thereto, and said apparatus further
4 comprises a refueling connection arranged and adapted to
5 connect to said fuel filling connection when said
6 free-flying platform is in a docked position in said
7 chamber.

1 **19.** A system for deployment in space comprising:

2 a space vehicle or a space station;

3 a free-flying platform equipped and adapted to carry
4 out one or more utility functions in space, wherein said
5 free-flying platform is equipped with a battery, a fuel
6 tank, maneuvering thrusters, on-board electronics, a
7 communication transmitter and receiver, and at least one
8 item selected from the group consisting of mission-specific
9 instrumentation, a camera, a sensor, and a tool, and
10 wherein said free-flying platform has a substantially
11 spherical outer configuration;

12 a servicing and inspection apparatus mounted on an
13 outside of said space vehicle or said space station and

14 including a container that defines therein a chamber
15 dimensioned and configured to receive said platform and
16 that has an opening through which said platform may pass
17 into and out of said chamber, a door movably connected to
18 said container so as to be movable between a closed
19 position in which said door closes said opening and an open
20 position in which said door opens said opening, and a
21 closing mechanism connected to said door and adapted to
22 selectively move said door to said closed position so as to
23 retain and secure said platform in said chamber in said
24 container; and

25 a monitoring and control station that is arranged
26 inside said space vehicle or said space station and that
27 includes monitoring, control and communication electronics
28 enabling an astronaut in said space vehicle or said space
29 station to monitor, control and communicate with said
30 free-flying platform outside of said space vehicle or said
31 space station.

1 **20.** A method of using the system according to claim 19,
2 comprising the steps of:

3 a) launching said space vehicle or said space station
4 from earth into an orbit in space, while keeping said
5 free-flying platform secured in said chamber of said
6 servicing and inspection apparatus with said door in
7 said closed position;

- 8 b) in said orbit, moving said door from said closed
9 position to said open position and releasing said
10 free-flying platform from said chamber;
11 c) after said step b), flying said free-flying platform
12 in space outside of said space vehicle or said space
13 station and performing said one or more utility
14 functions using said at least one item selected from
15 the group consisting of said mission-specific
16 instrumentation, said camera, said sensor, and said
17 tool, under control of said astronaut via said
18 monitoring and control station inside said space
19 vehicle or said space station;
20 d) after said step c), returning said free-flying
21 platform into said chamber of said servicing and
22 inspection apparatus, and then moving said door from
23 said open position to said closed position; and
24 e) after said step d), servicing said free-flying
25 platform in said chamber by at least one of recharging
26 said battery and refueling said fuel tank.